

On the origin of ruptures in detached retinae.

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THE occurrence of ruptures in detached retinae was first noted by von Graefe* in the early days of ophthalmoscopic research. The appearances presented in such a case were shortly afterwards pictured and described by Liebreich† in his well-known atlas.

The frequency with which ruptures in detached retinae can be seen has been estimated by Galezowski‡ and by Nordenson.§ The former found 131 ruptures in 649 eyes with detachment of the retina, or in 20 per cent. The latter noted forty-six ruptures in 119 eyes, or 38 per cent.

Von Graefe's explanation of the formation of the ruptures was that they are caused by the tension of the sub-retinal fluid, which he regarded as an exudation from the choroidal vessels.

De Wecker thinks that a rupture in the retina precedes the detachment, which latter is brought about by the passage outwards through the rupture of fluid which has collected between the shrunken vitreous and the retina. His objection to the older theory that detachment is due to choroidal effusion, is that it necessitates the disappearance of a corresponding quantity of the vitreous humour.

Leber and Nordenson have accepted de Wecker's views, and according to them a rupture in the retina is due to traction on it from bands which have formed in a shrinking vitreous. The almost invariable turning in of the margins of the rupture is, according to them, evidence of traction from the vitreous.

* 'Arch. f. Ophthal.,' Bd. i, Ab. 1, s. 358.

† Pl. vii, fig. 1.

‡ 'Recueil d'Ophthal.,' 1883, p. 669.

§ 'Die Netzhautablösung,' 1887.

Raehlmann* recently has returned to the older view that detachments primarily are due to exudations from the choroidal vessels. He meets de Wecker's objection by pointing out that the exuded serous fluid can become mixed with abnormally fluid vitreous by a process of diffusion through the retina. This diffusion occurs according to the ordinary physical law,—that is to say, a larger quantity of less albuminous liquefied vitreous passes outwards into the subretinal space, than of more albuminous choroidal serous exudation passes inwards into the vitreous chamber.

It is in this way, he argues, that a detachment tends to extend. He brings forward experimental evidence in support of his views, and urges many difficulties to the acceptance of Leber's theory.

He believes the ruptures in the detached retinae to result from the tension of fluid behind the retina, as Graefe did. When the tension on the outer side of the retina becomes, as the result of diffusion of more fluid outwards than inwards, greater than on the inner side, it, he argues, gives way, the edges of the rent being naturally carried inwards.

In 1892, Elschmig of Graz,† from the examination of two cases clinically, put forward a new theory with regard to ruptures in detached retinae. He supposes in the first place that there has been a patch of retino-choroiditis, and that the retina and choroid have in that position become firmly adherent. Such patches are often met with in highly myopic eyes. Subsequently when the detachment of the retina occurs, the piece of retina attached to the choroid remains adherent and becomes torn away from the rest of it; a hole is thus formed in the detached portion.

The first case which suggested this theory to him was that of a student who had received an injury to his eye from a fencing foil; a detachment of the retina com-

* 'Arch. f. Augenheilk.,' Bd. xxvii, s. 1.

† 'Klin. Monatsbl. f. Augenheilk.,' Bd. xxx, s. 416.

menced in the outer peripheral part of the fundus, and when first examined patches of central choroiditis could be seen. About two months later the outer half of the retina had become detached, but in it corresponding to the macular region was an oval opening, the long axis of which was one optic disc's breadth in diameter; through this opening the choroidal vessels and pigment epithelium could be seen.

In his second case there was a large detachment of the retina in the lower part of the fundus, which had an irregular-shaped opening in it, through which the choroid, showing distinct signs of inflammation, was visible. The edges of the opening in the retina rolled outwards towards the choroid, and not inwards towards the vitreous, as was pointed out by Leber to be usually the case. Across the opening two delicate threads ran, probably obliterated blood-vessels, which, as Elschnig suggests, might have been torn from the patch of retina left adherent to the choroid.

I have now to bring forward two cases which give definite anatomical proof of the occasional formation of ruptures in detached retinae in the way so ingeniously thought out by Elschnig.

CASE 1.—Alfred C—, æt. 8, was admitted to the Moorfields Hospital under Mr. Lawson on June 30th, 1891. He had received a wound of his left eye three months previously from a piece of glass.

On examination there was found to be deep ciliary injection of his left eye. A linear cicatrix started in the lower part of the cornea, and extended across the sclero-corneal margin; to it the iris was adherent; there was no anterior chamber. The tension of the eye was minus, and it was doubtful if he could distinguish light from dark with it.

The vision and refraction of his right eye were not noted. The day after the patient's admission his left eye was excised.

On making an equatorial section of the recently excised

eye, some pale, straw-coloured, subretinal fluid escaped. The lens was found to be clear, and not wounded, but its capsule was adherent to the corneal scar. The vitreous was shrunken, and the retina completely detached from the ora serrata up to the optic disc.

In the yellow-spot region was seen a patch of choroidal atrophy with pigmentation at its margin. Microscopical examination of this patch showed the choroid much thinned, with patches of deeply-staining round-cell exudation at the margin of it. The pigment epithelium over the atrophied area was in places absent, and in others much thickened. Intimately adherent to the inner surface of the atrophied choroid was an isolated patch of very degenerate retina.

CASE 2.—Jane H—, æt. 53, was admitted to the Moorfields Hospital under Mr. Tweedy, on July 3rd, 1890. She stated that she had always been very near-sighted, but had never worn glasses. A year previously she had had an attack of inflammation in her right eye, after which it became quite blind; she had never had any injury to it.

On examination there was found to be some ciliary injection of the right; the anterior chamber in it was shallow. The iris was dull and discoloured, its pupillary border was bound down to the lens capsule, and its peripheral portions bowed forwards; the pupil was closed by an inflammatory membrane; the tension of the eye was — 1, and she was unable with it to distinguish light from dark. Her left eye was highly myopic, vision without glasses being = $\frac{2}{200}$ only. Ophthalmoscopically extensive choroidal changes were seen about the posterior pole.

The day following her admission her right eye was excised. On opening the freshly removed eye by an equatorial section, the retina was found to be completely detached from the ora serrata up to the optic disc. Attached to the outer surface of the retina were some shreds

of a yellow-coloured substance, and on the inner surface of the choroid were some patches of a similar material. Microscopically this was found to consist of epithelial cells with pigment granules in them, and had evidently been derived from the pigment epithelium lining the inner surface of the elastic lamina. There were several large areas of atrophy in the choroid. In the yellow-spot region there was a patch of atrophy with a pigmented margin, and the sclerotic in that position was somewhat depressed backwards. Microscopical examination of this region showed the sclerotic to have been somewhat thinned, the vascular layers of the choroid were considerably atrophied, and the elastic lamina and pigment epithelial layer were entirely absent. Adherent to the atrophied choroid and intimately incorporated with it was some atrophied retinal tissue completely isolated from the remainder of the retina, which lay folded in the centre of the globe. At the margin of the atrophic area in the choroid on either side of the section was a collection of inflammatory round cells over which there was some heaping up and thickening of the pigment epithelium.

In each of these two eyes there must have been, previous to the occurrence of detachment of the retina, a localised central patch of choroido-retinitis which resulted in atrophy of the two tunics and firm adhesion of them ; so firm must have been the adhesion that when the detachment occurred the patch of adherent retina became torn away from the rest of that membrane instead of becoming separated from the choroid.

It is by no means uncommon to meet, in the pathological examination of eyes, with retinae which have become completely detached except in one or two places where they have acquired adhesion to the choroid as the result of past inflammation. In eyes with such a condition the retina is found lying folded in the centre of the globe, while passing outwards from it are small columns which go to the places where the adhesions exist. These cases

represent an intermediate stage in the formation of a rupture.

In bringing forward specimens in proof of Elschnig's theory of the formation of ruptures in detached retinae, I do not wish to deny the possibility of inflammatory exudations into the vitreous acquiring adhesions to the retina, and then on becoming organised and contracting, drawing the retina away from the choroid and perhaps producing rents in it. I doubt, however, if the rents so produced would be visible ophthalmoscopically, and I think the diffusion theory and experiments of Raehlman offer much the most probable explanation of the ætiology of ordinary cases of detached retina seen with the ophthalmoscope.

I find it difficult to believe that it is the tension of fluid behind a detached retina alone, which causes it to rupture; it seems so much more probable that whenever a tendency to tension in the subretinal fluid occurred it would lead to a further separation of the retina from the choroid rather than to a rupture in it. I do not attach great importance to the direction in which the edges of the ruptured retina turn, as evidence for or against any theory, as Leber and others have done, because it is a matter of common observation that whenever an eye is cut open the edges of the retina tend to roll inwards; just as the cut edges of the lens capsule tend to roll outwards, or the cut extremities of Descemet's membrane forwards.

It is interesting to note that in the one case recorded by Elschnig in which the edges of the rupture in the retina were seen to be turned outwards and not inwards, a delicate thread ran across the opening, which he took to be an obliterated blood-vessel. We can well understand in that case how, when the patch of adherent retina became torn away from the rest of that membrane, only leaving this blood-vessel in the site of it, that the presence of the vessel would act as a bar and prevent the usual rolling in of the edges of the rupture.

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